Chapter 8
Analytics of Public Reactions to the COVID–19 Vaccine on Twitter Using Sentiment Analysis and Topic Modelling

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ABSTRACT

The number of new COVID-19 infections and deaths is still increasing worldwide, which led governments to take a series of mandatory actions. The COVID-19 vaccine announcement kindled the various rays of emotions among the social media users. Thus, this chapter aims to discover public reaction regarding the COVID-19 vaccine posts on a social media platform, specifically Twitter, to extract the most discussed topics during the period April 25, 2021 to May 2, 2021. The extraction was based on a dataset of English tweets pertinent to the COVID-19 vaccine. The Latent Dirichlet Allocation (LDA) was adopted for topics extraction whereas VADER lexicon-based approach was applied for sentiment analysis. Based on the results, most tweets expressed neutral and positive opinions about the COVID-19 vaccine. Regarding the latent themes discovered about the vaccine, most of topics have exposed the public trust towards the COVID-19 vaccine compared with the mistrust ones. This study can assist governments and policy makers to track public opinions for better decision-making during pandemics.

INTRODUCTION

In addition to health promotion and disease-preventing programs, healthcare systems are providing universal access to affordable pre-paid healthcare services. There are different organizations of healthcare systems around the world. The emphasis is on primary, secondary, and tertiary healthcare, rates and sources of funding, the patient populations, their burden of disease-facing communities, and their levels of human and technical infrastructure development. Programs differ according to the proportion of the healthcare provided by the public (government) and by private installations (Dyro, 2012; Jaafar et al., 2013). Furthermore, access to healthcare is a key element in a health system and has a direct effect on the burden of disease impacting many developing countries. The measurement of accessibility to health care helps to better understand the performance within and among countries of health systems which enables evidence-based healthcare policies to be created (Black et al., 2004).

Covid-19 pandemic, also known as the coronavirus pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case we diagnosed back in December 2019 in Wuhan, China. The World Health Organization declared the outbreak a Public Health Emergency of International Concern in January 2020 and a pandemic in March 2020. As of 1 January 2021, more than 99.5 million cases have been confirmed, with more than 2.31 million deaths attributed to Covid-19 (Zhu et al., 2020). The pandemic has caused global social and economic disruption, including the largest global recession since the Great Depression. It has led to the postponement or cancellation of events, widespread supply shortages exacerbated by panic buying, agricultural disruption, and food shortages. Many educational institutions have been partially or fully closed. Misinformation has circulated through social media and mass media. There have been incidents of xenophobia and discrimination against Chinese people and against those perceived as being Chinese or as being from areas with high infection rates (WHO, 2021).

Vaccination is a 'miracle of modern medicine' and the most important contribution to public health in the past 100 years. The value of vaccination has once again been emphasized with the outbreak of SARS-CoV-2 also named Covid-19, with no scientific breakthrough ever more eagerly anticipated than this one. Considerable scientific resources and billions of pounds have been placed on producing an effective vaccine (Kazi Mizanur Rahman, 2021). Vaccine hesitancy may be fueled by health information obtained from a variety of sources, including new media such as the Internet and social media platforms. As access to technology has improved, social media has attained global penetrance. Social media, unlike conventional media, allows individuals without editorial control to easily produce and distribute content internationally. Users may pick content streams for themselves, leading to ideological isolation. As such, there are considerable public health concerns raised by anti-vaccination messaging on such platforms and the consequent potential for downstream vaccine hesitancy, including the compromise of public confidence in future vaccine development for Novel pathogens for the prevention of Covid-19, such as SARS-CoV-2. The present role of social media outlets in propagating vaccine hesitancy is discussed in this analysis and further steps are explored in how social media can be used to enhance health literacy and promote public interest in vaccination. People worldwide publish their ideas and discuss several topics, including their health conditions and public health events. The most meaningful and valuable information in these tweets is the sentiment of the publishers. Once people publish a tweet, they have their own opinions and attitudes towards the topic they are talking about, such as satisfaction or unsatisfaction, positive, and negative opinions (Smailhodzic et al., 2016). These sentiment data will be later an invaluable source for organizations, companies, or even institutions for doing their research through

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